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esis and from restitutions do not appear to compel us to go beyond vitalism in sense (1)—a sense which he would evidently regard as tantamount to mechanism.

The vitalistic negation may, however, (B) refer to the large processes of phyletic evolution, or to the adaptations which have been realized in the course of that evolution, rather than to the peculiarities of the behavior of the material elements in individual living bodies. Some vitalists (Bergson and Pauly, for example) make much of considerations of this type. But this is only a superficially distinct form of the negative side of vitalism. For all these large aspects or consequences of evolution must be due primarily to processes of form-building taking place in the development of individual organisms. The vitalist must, then, in any case, maintain that these separate processes in the individual are not capable of "mechanistic" explanation; and his doctrine will, therefore, in the last analysis reduce to one of the three negations mentioned in the preceding paragraph. It remains possible that important evidence for one or another of these contentions may be found by the examination of the lines of direction and the broad results of racial evolution—of such phenomena, for example, as orthogenesis.

This review seemed most likely to be useful if it were made a species of historical and systematic introduction to the vitalistic controversy. In the discharge of the usual duties of a reviewer, however, it should be added that Driesch's book, though an important and valuable contribution to the discussion over vitalism, is not very successful as a work of popularization. It is ill planned and awkwardly executed, diffuse, involved, and written in a tongue far removed from idiomatic English. If designed to appeal to biologists and philosophers, on the other hand, the book would have been more effective if the author could have brought himself to let the entelechies alone, to omit many of his excursions into Kantian epistemology, and to content himself with expounding and interpreting (as he is eminently qualified to do) all those distinctive peculiarities and "discontinuities" in the

action of living matter, which have been definitely established by the past twenty years' progress in the study of *Entwicklungsmechanik*.

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A Treatise on Zoology. By Sir RAY LANKESTER. *Crustacea*, W. T. CALMAN. Part VII. Appendiculata. Third fascicle. London, Adam & Charles Black. 1909. Price, twelve shillings and sixpence, net.

This is an excellent account of the class of the Crustacea from a purely zoological standpoint. The most important and striking feature of the book is the systematic arrangement of this highly diversified group of creatures, and the zoologist who is acquainted with the older systems of the crustaceans will be astonished, at the first glance, that certain systematic groups, which are familiar, have entirely disappeared. So, for instance, there are no "Entomostraca," no "Edriophthalma" and "Podophthalma," no "Schizopoda." Yet the new system used by Calman is entirely founded upon the most recent investigations, to which he himself has contributed a good deal.

In the present book, the class of Crustacea is divided into five subclasses: Branchiopoda, Ostracoda, Copepoda, Cirripedia, Malacostraca. The latter subclass consists of two "series": Leptostraca (order: Nebaliacea) and Eumalacostraca, with four "divisions": Syncarida, Peracarida, Eucarida and Hoplocarida. The Syncarida consist of the order Anaspidacea (the remarkable, recently discovered genera *Anaspides*, *Paranaspides*, *Koonunga* and possibly *Bathynella*, the affinities of which have been worked out chiefly by Calman himself); the Peracarida contain the orders Mysidacea, Cumacea, Tanaidacea, Isopoda, Amphipoda; the Eucarida possess the orders Euphausiacea and Decapoda, and the Hoplocarida the order Stomatopoda. This arrangement surely represents the natural affinities better than any of the older systems. Of course, it is impossible, in a review, to give a full account of the morphological facts, which substantiate the views of the author, but these facts are prop-

erly set forth in the text by him under the different groups, by frequent comparison of their structures with those of the other groups.

In the first chapter, a general account of the whole class is given, including a *historical sketch*, the general *morphology*, the *embryology*, *phylogeny* (chiefly with regard to the fossil forms). The morphology treats of the morphological and anatomical details in the following sequence: exoskeleton (body, limbs, branchiæ), alimentary system, circulatory system, excretory system, nervous system and sense organs, glands, phosphorescent organs, reproductive system.

Of the following chapters, II. to V. treat of the Branchiopoda, Ostracoda, Copepoda and Cirripedia, and the same general arrangement of the subject matter as above is followed under each group. Chapter VI. gives a general morphological introduction to the subclass Malacostraca, defining their systematical divisions, and of the following chapters, VII. to XVI., each gives an account of one of the orders of the Malacostraca: Nebaliacea, Anaspidacea, Mysidacea, Cumacea, Tanaidacea, Isopoda, Amphipoda, Euphausiacea, Decapoda and Stomatopoda.

In the treatment of the various groups, the general arrangement is similar to that used in the introductions to the larger groups, but "remarks on habits," a more detailed discussion of "paleontology," and remarks on "affinities and classification" are added, and this is followed by a sketch of the system, which gives diagnoses of the main systematical divisions of each order, bringing it down to the families and genera, the former of which are quoted rather completely by name, while of the latter the most important ones are named.

The different orders have received a rather uniform treatment, which is a feature of the book which should be especially mentioned, for we may sometimes observe, in similar treatises, that the author is not quite impartial, devoting, for obvious reasons, more time and space to those groups to the study of which he has applied himself more energetically. Calman has avoided this, and thus the whole book makes the impression of a carefully

planned and well-executed attempt to give an account of the morphology, anatomy and embryology of the whole class. At the same time, nothing of importance has been omitted. Of course the remarks on habits and on paleontology are rather short, and might be regarded as unsatisfactory, but we are to consider that the book forms a part of a series entitled, "A Treatise on Zoology," and not of ecology or paleontology, and thus these sides could not have been considered to any extent in a book of this character. For the same reason also remarks on geographical distribution are omitted.

The book preeminently is a zoological treatise, dealing with the purely zoological side of the matter: morphology, anatomy, embryology and the systematics. With regard to this, it is a complete success, and should be used, by zoologists, not only by the side of other textbooks, but is apt to supersede the latter, thus becoming, for the present time, the standard text-book on crustaceans. Anybody desiring to get any information within the range as defined above will surely find it here, and not only this, but he will find the account given up to date. A rather complete index will serve to facilitate the search for the desired information, and references to literature at the end of the various chapters will give a direction for the study of further particulars.

A. E. ORTMANN

Lehrbuch der Paläozoologie. Von E. STROMER VON REICHENBACH. I. Theil: Wirbellose Tiere. Pp. 342; 398 text figures. Leipzig, Teubner. 1909. Price 10 Marks in cloth.

Von Stromer presents here an excellent elementary text-book of paleontology, written in good style and not too technical in language. It deals with the fossil invertebrates viewed almost entirely from the biologic standpoint, and while the geologic development is also presented, it is too much abbreviated to be of much value from the side of evolution or stratigraphy. The illustrations are excellent half-tones of wash-drawings made especially for the work. The printing, of course, is the best and the weight of the book not heavy.